GREEN TECHNOLOGY: A WAY TO ATTAIN SUSTAINABLE ENVIRONMENT

T. Srithiga, Guest Lecturer, Government Law College, Coimbatore

ABSTRACT

Green Technology Innovation involves introducing and developing eco-friendly ideas to reduce environmental damage and protect natural resources. Green technology is also referred to as clean technology or environmental technology. Green technology innovation aims to meet society's requirements while limiting the depletion of natural resources and promoting environmentally friendly practices. This approach to innovation prioritizes product reusability for future use. Green technology aims to restore harm caused by climate change. This article examines green technology innovation in emerging nations, with an emphasis on India to provide context for other countries. This article discusses the importance and problems of green innovation. The paper's summary can be used to better understand the problems of green innovation and develop effective strategies. Adopting green technologies is crucial for long-term growth. Efforts are underway to protect and improve the environment for a resource-efficient and sustainable future. This research advises using green technologies for sustainable development. In inference, green technologies increase living standards while minimizing environmental damage, leading to sustainability.

Keywords: Green Technology, Environmental Sustainability, Natural Resources, Innovation, Sustainable Future

INTRODUCTION

Green technology involves developing goods, methods, and structures to safeguard the environment by decreasing negative impacts from human activity. "Green technology" refers to products, services, or processes that meet certain characteristics. This type of technology emits little or no greenhouse gases, is safe to use, promotes a healthy climate, reduces electricity consumption, and promotes the use of natural energy. Green technology is designed and utilized in a way that maintains the atmosphere and conserves natural resources. Green technology, a component of the sustainable technology revolution, holds significant importance. It's time to acknowledge the growing significance of green technology for humanity. There are several reasons supporting the benefits of green technology, making it a topic worthy of extensive discussion. Green technologies are becoming increasingly important in business and at home, but they must be implemented swiftly. It's clear that humans must act to safeguard the environment and save energy. Going green can simply help us get out of our current situation. Prioritize tasks before they become overwhelming, we must recognize the role of green technology resolving this problem.

GREEN TECHNOLOGY

Green technology is the development and application of technologies that reduce the negative effects of human activity on the environment and society. It includes a diverse set of products, services, and activities that promote a more sustainable future. Often referred to as "green tech," the notion is gaining popularity as the globe explores solutions to climate change. Green technology developers apply scientific knowledge and creativity to help conserve natural resources, reduce greenhouse gas emissions, and encourage the use of renewable energy.

Green technology, also known as environmental technology or clean technology, refers to a wide range of advancements designed to reduce the environmental effect of human activities. It entails the creation and implementation of goods, services, and processes that use renewable resources, minimize emissions, and increase energy efficiency. The primary purpose is to tackle environmental issues while also promoting economic growth.

SUSTAINABLE DEVELOPMENT

Currently, there are numerous definitions of sustainable development. Most definitions emphasize the need of making decisions that include the impact of economic growth on the environment, economy, and society.

Brundtland's report defines sustainable development as "development that meets current needs without compromising future generations' ability to meet their own needs." [1]

Sustainable development is defined as "Caring for the Earth" and aims to improve human life quality within the capability of supporting systems. Sustainable development involves employing limited resources in a way that does not hurt or worsen the environment, while simultaneously preserving its relevance for future generations.[2]

PRINCIPLES

Green technology solutions are intended to be sustainable; they are designed to full fill current requirements without compromising future generations' capacity to meet their own. They should reduce their environmental effect in a variety of ways, including as using renewable energy sources and focusing on energy efficiency.

Green technology plans take into account the full product or service lifetime, from raw material extraction to end-of-life disposal. Their proponents want to know the complete environmental impact of their operations in a circular economy.[3] They also acknowledge the social consequences of technical advancement, emphasizing social equality and well-being. These consequences include examining the influence of technology on local communities, workers, and customers, and aiming for new solutions that benefit society as a whole.

TYPES OF GREEN TECHNOLOGY

Green technology may be classified into numerous kinds, including:

Renewable Energy

Renewable energy, often known as clean energy or green energy, is derived from natural resources that replenish more quickly than they are depleted. Renewable energy and alternative fuels often create zero carbon emissions and low levels of air pollution. Renewable energy sources include solar, wind, hydropower, geothermal, and biomass. Solar panels and wind turbines are typical examples of this technology.

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[1] World Commission on Environment and Development WCED 1987. Our common future. The Brundtland Report. Oxford: Oxford University Press

[2] United Nations Conference on Environment and Development 1992. Agenda 21: Programs of Action for Sustainable Development. Rio Declarations on Environment and Development, Statement of Forest Principles, Final Text of Agreement by Governments at the UN (UNCED), June 3-14, , Rio de Janeiro, Brazil.

[3] P. Sridhara Acharya, "Innovations in Effective Management of Energy using Green Technology," International Journal of Conceptions on Management and Social Sciences, vol. 3, no. 2, pp. 18–22, 2015, doi: 10.5281/zenodo.268814.

Energy Efficiency

Monitoring and improving energy use may help decrease waste and expenditures. Green technology includes developing or enhancing goods and systems that consume less energy. Energy-efficient appliances and LED lights, as well as energy storage technologies, smart meters, and energy management systems, are examples of applications for this technology.

Waste Management

Green technology may contribute to more environmentally friendly resource and product disposal. garbage management technologies include modern recycling facilities that transform garbage into useful resources like electricity and raw materials for industry. They also include waste-to-energy systems, which employ controlled incineration to transform garbage into electricity.

Transportation

Electric vehicles fueled by rechargeable batteries cut pollution from fossil fuels. Biofuels and other low-carbon fuel technologies fit under this category. This endeavor includes advancements in public transportation and urban infrastructure to enable electric cars (EVs), as well as bicycle and pedestrian travel.

Water and wastewater treatment

Green tech includes technologies that purify water for safe reuse. Low-flow fixtures, rainwater harvesting, and sophisticated filtration technologies are all examples of ways to remove toxins from wastewater and make it acceptable for irrigation or industrial processes.

Agriculture

Smart farming and sustainable agricultural approaches strive to decrease the environmental effect of food production while ensuring food security. Precision agriculture, which optimizes resource utilization using data analytics and sensors, and vertical farming, which produces crops in stacked layers with LED lighting and hydroponic systems, are two examples.

Carbon Capture Technologies

Carbon capture and storage (CCS) is the method of absorbing carbon dioxide (CO2) emissions from industrial operations or the atmosphere and permanently storing them to prevent them from being released into the atmosphere. Other carbon capture methods include direct air capture (DAC) devices, which extract CO2 straight from the air. The category also covers

bioenergy with carbon capture and storage (BECCS), which combines biomass energy generation with CO2 collection and storage.

Sustainable Buildings and Construction

Green building technologies lessen the environmental effect of building construction and operations. Examples include energy-efficient architecture, green roofing, and the use of environmentally friendly materials like bamboo or recycled steel. These methods assist to minimize energy use, water consumption, and trash output in buildings.

Carbon-tracking software

Carbon monitoring software enables businesses to monitor, measure, and report their greenhouse gas emissions. These technologies enable businesses to identify pollution hotspots, set reduction targets, and measure their progress toward sustainability objectives. Carbon accounting systems, risk management solutions, and supply chain management software with emissions data are among examples.[4]

BENEFITS OF GREEN TECHNOLOGY

"Green Technology" encompasses several strategies and techniques for reducing environmental impact. Green technology reduces costs by improving product design, minimizing waste, lowering carbon footprint, and increasing organizational efficiency. It also produces new jobs. Green technology improves quality of life and reduces environmental impact and costs compared to outdated technologies. There are several benefits of green technology, as follows:

Reduce energy consumption

Green technology reduces energy consumption by prioritizing energy efficiency throughout the product's lifespan. Efficient production equipment and sustainable product design may minimize energy usage, leading to savings for both the firm and customers. Green technology, including wind turbines, solar photovoltaic systems, and hydropower, helps reduce reliance on non-renewable energy sources like fossil fuels.

Recycling technology reduces waste

Recycling has the advantage of converting rubbish into a useful resource. This green technique

[4]M. Wira, M. Shafiei, and H. Abadi, "The Importance of Green Technologies and Energy Efficiency for Environmental Protection," International Journal of Applied Environmental Sciences, vol. 12, no. 5, pp. 937–951, 2017.

eliminates waste and recovers raw resources for future production. Recovered materials help safeguard natural resources by reducing landfill waste and the requirement for continuous raw material extraction.

Reduces water consumption.

Water is a valuable resource on our planet, thus it is critical that we do not waste it. Water is utilized extensively for both home and industrial purposes. Green technology can help to reduce water use. Green technology may improve product design and functioning, conserving water by only utilizing what is necessary for the activity.

Reduces air pollution.

Traffic and polluting industries are the two most common sources of air pollution in modern cities. Green technology such as hybrid and electric automobiles are being used and rewarded for reducing air pollution in cities.

Reduce our overall carbon footprint

Green energy may significantly **reduce our overall carbon impact**. This involves recycling and utilizing natural resources more efficiently. Innovative green technologies are being developed, including biogas and carbon capture and storage.

Green technology has three primary benefits: environmental, economic, and social. These initiatives contribute to sustainable development by addressing all three pillars.

1. **Environmental benefits**

Green technology promotes environmental sustainability by reducing waste and optimizing design and production processes. Green technology aids the environment by using sustainable energy, reducing energy and raw material use, recycling, requiring less maintenance, and producing longer-lasting products.

2. Financial Benefits

The economic benefits of green technology are driven by advances in efficiency. savings of manufacturing include cheaper energy costs, reduced demand for raw materials, improved design and efficiency, enhanced automation, competitive advantages, tax savings, and more.

3. Social benefits

Green technology benefits society since it improves the environment and creates new job

opportunities. Increasing green areas and sustainable urban development improves the urban environment, leading to stronger local economies and social networks.[5]

GOALS OF GREEN TECHNOLOGY

Green technology aims to achieve many goals. Green technologies attempt to address social requirements while preserving the planet's natural resources. Our goal is to meet current needs while maintaining high quality standards. You've come to the proper location to understand all about green technology's objectives. The emphasis currently is on developing materials that can be completely recycled or reused. Green technology prioritizes reducing waste and pollution through changes in manufacturing and consumption behaviours. Alternative technologies must be developed to prevent further harm to human health and the environment. Accelerating adoption would benefit the environment and contribute to global preservation. Explore the objectives of green technology, such as promoting sustainable living, developing clean energy, and reducing waste.

GREEN TECHNOLOGY AND ADMINISTRATION

On April 9, the Indian Prime Minister announced the formation of the Ministry of Energy, Green Technology, and Water, replacing the previous Energy, Water, and Communications Ministries. I believe that focusing on "green technology" is the most effective strategy to address environmental challenges while encouraging economic development. This correlates with worldwide governments' focus on environmental concerns, such as climate change. As global citizens, we share responsibility for making the earth a safer place to live. Using green technology increases people's quality of life by ensuring a sustainable climate. Continued pollution of air, water, and noise can negatively impact people's quality of life. The detrimental impact on the environment is reduced when we adopt green technology. Green technology has great potential to move the nation ahead. Green technology-based industries can create job opportunities for local residents. We should consider exporting our developed "green" items. Green technology and goods are in high demand, particularly in the clean energy and renewable energy sectors. Our country's solar photovoltaic business has been cited as a new source of economic development. Our forecasts indicate that the PV industry will contribute 4% of GDP by 2020. The government plans to encourage green technology through supporting measures.

[5] P. Sridhara Acharya, “Innovations in Effective Management of Energy using Green Technology,” International Journal of Conceptions on Management and Social Sciences, vol. 3, no. 2, pp. 18–22, 2015, doi: 10.5281/zenodo.268814.

Green technology may be developed and commercialized via collaboration between the corporate sector, professionals, and academia.[6]

KEY INITIATIVES

The Indian Prime Minister identified four key initiatives to ensure the National Green Technology Policy's success: According to the Prime Minister, the first phase is to strengthen institutional structures, particularly among officials, while the secondary is to foster an environment conducive to green energy growth.

1. He stated that the third step would help in the development of human capital by creating opportunities for education and training.

2. "The third step is to promote science and invention through the commercialization of Green Technology."

3. "The final move is to bolster campaigns to encourage and raise public consciousness of green technologies," he said at the announcement of the National Green Technology Policy

INITIATIVES BY GOVERNMENT FOR GREEN TECHNOLOGY

Since 2003, the government has provided tax incentives for companies that generate electricity from renewable energy sources (Renewable Energy) and implement energy-saving practices (Energy Conservation). These companies are eligible for investment tax allowances. Machines, components, and replacement parts utilized for renewable energy generation and conservation may be exempt from import tariffs and sales Tariff for one year. The 2009 Budget included exemptions for importers, such as photovoltaic service providers licensed by the European Commission, for solar system services used by third parties. Additionally, purchases of solar heating devices from local suppliers are exempt from sale taxes. Importers and permitted agents licensed by the EC are also exempt from import duties and sales taxes.

The EC must approve the retail tax deduction for energy-saving items such as insulating textiles, domestic freezers, light bulbs, ballasts, household fans, and air conditioning.

GREEN GROWTH IN INDIA

The 2030 Sustainable Development Agenda, ratified in September 2015, has 17 sustainable growth objectives and 169 targets, demonstrating member nations' commitment to the new

[6] M. Wira, M. Shafiei, and H. Abadi, "The Importance of Green Technologies and Energy Efficiency for Environmental Protection," International Journal of Applied Environmental Sciences, vol. 12, no. 5, pp. 937–951, 2017.

global agenda. Environmental protection and change are expressly addressed in the Indian Constitution. According to Article 48-A of the Constitution, the government is responsible for protecting and improving the environment, including ecosystems and wildlife.

The National Action Plan on Climate Change (NAPCC) and State Action Plan on Climate Change (SAPCC) are significant steps towards incorporating climate change into federal and regional planning. The NAPCC has eight federal missions that define climate change mitigation and adaptation goals.

The current eight missions are solar power, energy efficiency, sustainable farming, Green India, climate, Himalayan wildlife, and strategic understanding. The administration plans to reform the National Water Project and the National Assignment on Maintainable Agriculture, as well as launch new initiatives in green energy, health, waste-to-energy, and coastal regions. Under the Framework Agreement, India aims to reduce the carbon intensity of its GDP by 20-25 percent by 2020 compared to 2005 levels. India's Envisioned Nationally Determined Contributions (INDCs) target to reduce its GDP emissions by 33-35% by 2030, compared to 2005 levels. Green Growth refers to sustainable growth that benefits both society and the environment. It transcends climate innovation and transformation.

The Ministry of Environment, Forestry, and Climate Change targets poverty alleviation with sustainable development, recognizing the importance of green growth. India's Finance Commission emphasizes the importance of reconsidering growth plans to prioritize environmental protection and the availability of resources for underprivileged communities. The Finance Commission and Ministry of Environment, Forests emphasize the importance of inclusion in ensuring India's environmental sustainability and adapting to global climate change. The Fourteenth Finance Commission's forward expectation grant acknowledges states with high-quality ground cover, defined as moderate to thick forest cover. The Indian government aims to create "smart" cities that prioritize not just infrastructure and services, but also inhabitants' quality of life and a clean and stable environment.[7]

CHALLENGES

1. Initial Costs and Return on Investment

While the long-term advantages of clean technology are clear, the upfront price of

[7] GGGI and TERI, "Summary for Policymakers Green Growth and Sustainable Development in India Towards the 2030 Development Agenda," 2015.

implementing these technologies might be prohibitive for certain organizations. However, the declining prices of renewable energy technology, along with the potential for long-term savings, make a strong case for investing in green solutions.

2. Regulatory Landscape

The regulatory environment influences the uptake of clean technologies. Policies that encourage sustainable activities while penalizing environmental harm might hasten the shift to greener alternatives. However, uneven or insufficient restrictions might stymie growth.

3. Technological Advancement and Research

Green technology is a fast-changing sector that needs continuous study and improvement. Continuous innovation is required to solve rising environmental concerns and improve the efficacy of current green solutions. Collaboration among governments, corporations, and research organizations is critical to fostering technological progress.

4. Public Awareness and Education

The widespread implementation of clean technology is dependent on public knowledge and comprehension. Education projects emphasizing the environmental benefits, economic savings, and long-term sustainability advantages of green technology can help to create a more informed and environmentally responsible society.

CONCLUSION

Green technologies reduce waste and food generation, enhance living circumstances, and contribute to cleaner air in cities. In conclusion, green technology allows us to use renewable resources while maintaining a clean environment. Green technology may reduce pollutants and promote environmental sustainability. By overcoming obstacles, grabbing opportunities, and embracing constant innovation, incorporating clean into our everyday lives becomes more than a choice, but a shared duty for a healthier world and a more sustainable future.